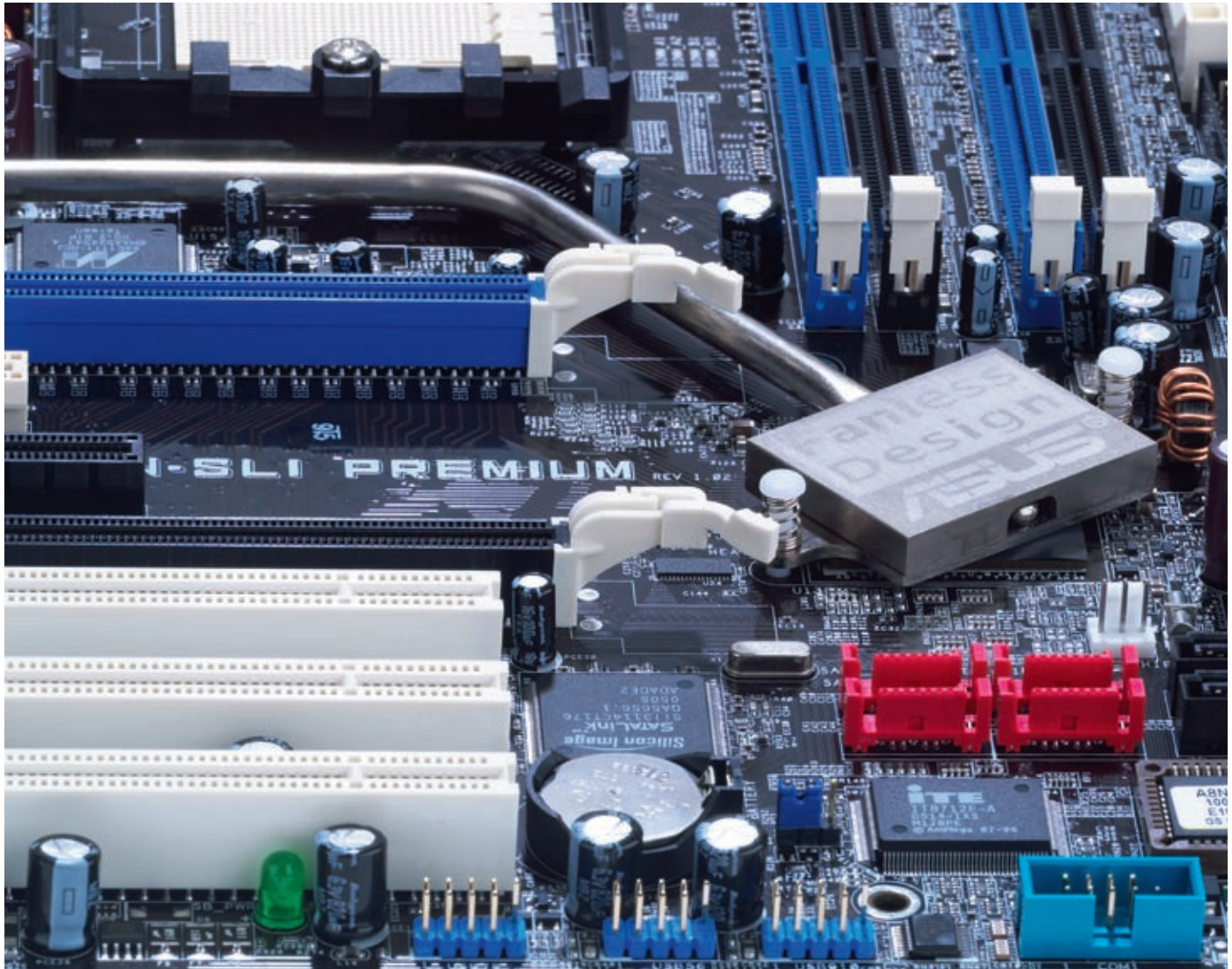




Motherboards

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A new motherboard can revitalise an ageing PC and make or break a brand new one. With 14 boards on test, including 10 different chipsets, we'll help you build the very best Intel or AMD PC

Last month we tested every type of Intel and AMD processor to show you which was the best for your PC. Even the best processor is useless on its own, however, so this month we've tested 14 motherboards.

The motherboard is possibly the most important part of your PC, as all the other components connect to it. The motherboard's performance therefore affects the performance of all your components and determines to what extent you can expand and upgrade your PC.

Unfortunately, choosing the right motherboard is not easy. There is a bewildering array of chipsets, manufacturers and standards, and just because your

processor fits in a motherboard doesn't necessarily mean it will work. Unless you're building a new PC, you'll also want to make sure that all your current components will work in your new system.

We've tested 14 motherboards from seven leading manufacturers, which cover each of the three most common processor sockets. They range from budget boards that include an integrated graphics chip to powerful gaming boards that can double your 3D power using two SLI or CrossFire graphics cards. Whether you're building your dream computer or upgrading an existing system, we'll help you find a motherboard that's perfect for your PC and your pocket.



CHOOSING A... MOTHERBOARD

Your choice of motherboard dictates which components you can have in your PC, so choosing the right one is complicated. Here are the essential things to consider before you buy

Whether you're building a PC from scratch or upgrading your current system, you must make sure your new motherboard supports the hardware you have or intend to buy. While many boards support a range of different standards and connectors, you need to choose carefully to avoid unnecessary knock-on upgrades.

You should also consider which features you need, as without them you could find yourself needing future upgrades. This guide will steer you through the maze so you know what to look for.

SOCKET SCIENCE

Motherboard upgrades are usually combined with processor upgrades. Always choose your processor first, then find a motherboard with the right socket for it. There are three common socket types today: Socket 939 for recent Athlon 64 processors, Socket 754 for older AMD Athlon 64 and current Sempron chips, and Socket LGA775 for recent Intel Pentium and Celeron chips. The underside of each type of chip looks quite different. Intel LGA775 chips have no extruding pins. An AMD Socket 939 processor

has a solid mass of pins underneath, and if there's a pin-free square in the centre, it's a Socket 754 chip.

The fact that a processor physically fits into a socket doesn't mean it will necessarily work, though. Socket 754 motherboards sometimes need a BIOS update before they will recognise Sempron chips, and Socket 939 and LGA775 boards may need updates to work properly with dual-core Athlon X2 or Pentium D processors.

To confuse matters further, motherboards come in several sizes. The two most common are ATX and microATX. ATX boards are rectangular and measure 305x245mm, while microATX boards measure 244x244mm. Most tower PC cases accommodate both sizes, but check before you buy.

GETTING THE RIGHT BUS

Your motherboard's expansion busses allow you to connect components to the board. All current boards provide a PCI bus for components such as a TV card, but for graphics you'll get an additional AGP or PCI Express bus. PCI Express is gradually replacing AGP, so if you are building a brand new system make sure you buy a PCI Express board to

take advantage of the latest graphics and other expansion cards. If you already have an AGP graphics card you want to keep, pick an AGP board.

Some motherboards have two PCI Express x16 slots for graphics cards. These usually allow you to link two cards together to improve performance significantly. This technology is called either SLI, for nVidia cards, or CrossFire, for ATI cards. A few motherboards have two card slots but support neither standard, which means the two cards cannot work together on the same 3D image.

If you don't play 3D games, using integrated graphics is inexpensive, and with no graphics card fan, generally quieter too. All the motherboards with integrated graphics in the group have a spare PCI Express x16 slot, so you can build a PC cheaply and add more 3D power in future if you need it.

CALLING THE SLOTS

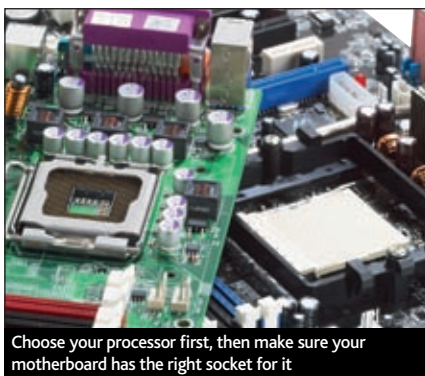
All the motherboards in this month's Labs have built-in audio and network chips. Not all have Gigabit Ethernet or 7.1 audio, however, so if you are a LAN party gamer or want to build a Media Center PC, you should look for a fast network controller or the best audio hardware. If your motherboard is missing something you need, you can usually upgrade using a PCI Express x1 or PCI slot, but make sure you have enough expansion slots for future growth. If you want to build a quiet computer, look for a board with a passively cooled Northbridge.

Depending on the chipset, modern boards use either DDR or DDR2 memory. In general, LGA775 motherboards use DDR2 and Socket 939 boards use DDR, but this is not always the case. The processor you choose dictates what speed of DDR or DDR2 memory you need, see our October 2005 *Upgrade Shopper* booklet for full details.

THE NEVER-ENDING STORAGE

The ability to store vast amounts of data is no good unless you can access it quickly, and the type of hard disk you have in your PC has an effect on overall performance. While optical drives use the IDE standard, modern hard disks have Serial ATA (SATA) and Serial ATA II (SATA II) interfaces. SATA hard disks are easier to install than IDE, and with smaller, neater cables they are far easier to arrange in a RAID array for extra speed.

All the motherboards in the group have at least two SATA ports and support RAID, but with more SATA ports you can add a larger-capacity array with more hard disks. If you have older IDE hard disks that you'd like to use, make sure your motherboard has more than one IDE interface.



Choose your processor first, then make sure your motherboard has the right socket for it



Some Northbridge heat sinks have noisy fans. For a quiet PC, you'll need a passive Northbridge heat sink

HOW WE TESTED

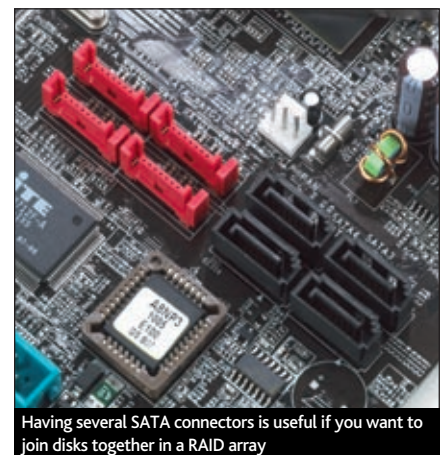
To make sure our results were consistent, we tested each motherboard using identical components as far as possible. We used a 160GB Maxtor hard disk and Samsung DVD-ROM drive, and we fitted every board with 1GB of Crucial DDR or DDR2 RAM, depending on which type the motherboard supported. AGP motherboards were fitted with an AGP Radeon X700 graphics card, and PCI Express motherboards were tested using a PCI Express Radeon X700.

Motherboards with integrated graphics were tested using the integrated graphics processor. This means their 3D scores can't be compared

with those from the other boards, but they allow you to gauge the power of each integrated chip.

As we tested motherboards with three different socket types we had to use three different processors, so our benchmark results can't be compared directly between socket types. We tested the Socket 754 motherboards with an AMD Sempron 3400+ processor, the Socket 939 boards with an AMD Athlon 64 3500+ and the LGA775 motherboards with a Pentium 4 560 processor running at 3.6GHz.

We also tested every motherboard with a clean installation of Windows XP Service Pack 2. We used the drivers supplied with each board and the latest graphics drivers from ATI and nVidia.



Having several SATA connectors is useful if you want to join disks together in a RAID array



Motherboard features explained

Create a wish-list of motherboard features with the help of our jargon-busting guide

AUDIO OUTPUTS Most modern motherboards have surround sound, and many have S/PDIF digital audio outputs

USB2.0, FIREWIRE AND ETHERNET PORTS USB2.0 ports are used to connect most modern peripherals. FireWire is faster than USB2 and used by digital video cameras and external hard disks. The Ethernet port is for connecting to a wired network and may run at 100Mbit/s or 1,000Mbit/s

PARALLEL PORT, D-SUB AND DVI PORTS Use these to connect older printers that don't use the USB interface, and external displays if the motherboard has integrated graphics

PCI EXPRESS x1 SLOT The PCI standard is gradually being replaced by PCI Express. The latest expansion cards plug in to a PCI Express x1 slot

PCI SLOTS Most current expansion cards such as TV tuners and modems plug into a PCI slot

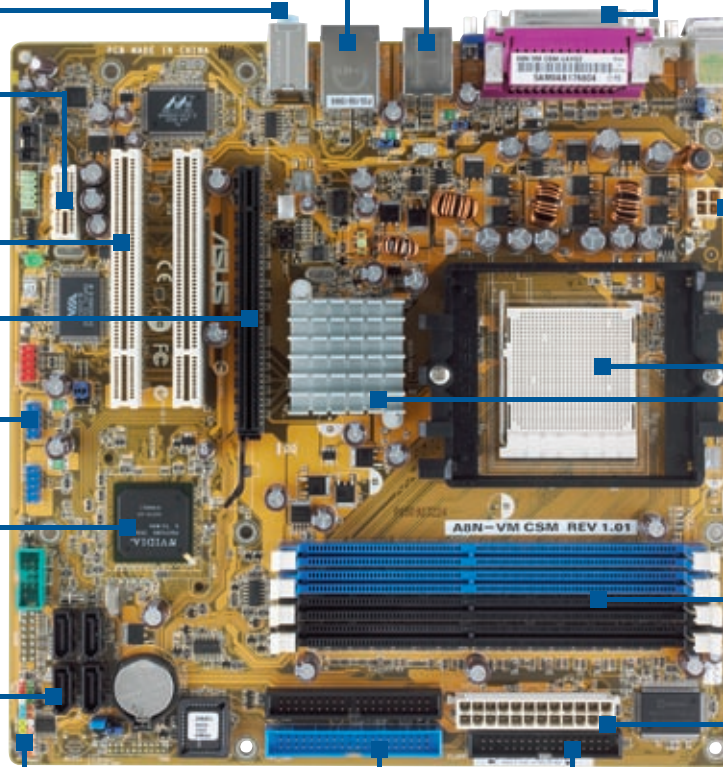
PCI EXPRESS x16 SLOT This is a dedicated graphics card slot, and runs much faster than the previous AGP standard. PCI Express graphics cards plug in here

USB2.0 AND FIREWIRE HEADERS These groups of pins are for attaching extra ports to the motherboard on brackets

CHIPSET SOUTHBRIDGE This controls the motherboard's slower devices, such as disks and the keyboard and mouse. It is linked to the Northbridge

SERIAL ATA (SATA) PORTS Serial ATA hard disks connect to these ports. Some motherboards have dedicated ports for a RAID array

CASE FRONT PANEL CONNECTORS Your PC case's power and reset buttons attach here, as well as the PC speaker and LEDs for power and hard disk



PS/2 PORTS Connect a PS/2 keyboard and mouse here

FOUR-PIN POWER CONNECTOR Most modern motherboards have this auxiliary connector. Plug in a four-pin 12V connector here

PROCESSOR SOCKET There are three prevalent socket types: Socket 939, Socket 754 and LGA775. This is a Socket 939 socket for AMD Athlon 64 processors

CHIPSET NORTHBRIDGE This connects to your PC's high-speed components, such as the processor, RAM and graphics card. It can also house the graphics logic if the motherboard has integrated graphics

MEMORY SLOTS For either DDR or DDR2 RAM, depending on the board. If the board supports dual-channel memory, install it in pairs using the coloured slots as a guide

ATX POWER CONNECTOR These have either 20 or 24 pins, depending on the motherboard. Your case's power supply connects here

IDE PORTS Optical drives and older IDE hard disks connect to these ports. You can attach two drives per port

FLOPPY DISK CONNECTOR For a 3½" floppy disk drive

REVIEW SOCKET 754 MOTHERBOARD

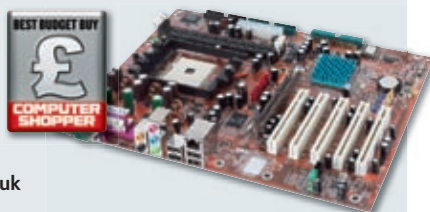
ABIT NF8-V

RATING ★★★★★

PRICE £47 inc VAT

SUPPLIER www.komplett.co.uk

DETAILS www.abit.com.tw



Despite having a lower specification than Gigabyte's GA-K8NS Pro, ABIT's NF8-V is faster and significantly cheaper. As it costs just £47, we weren't expecting it to be packed with features. It has just two SATA ports for a RAID 0 or 1 array, no FireWire and only two DDR memory slots. The sound card is basic, with no support for 7.1 surround sound and no S/PDIF outputs.

However, the NF8-V is fast. It performed better than Gigabyte's GA-K8NS Pro in both PCMark04 and our *Shopper* benchmarks. Its 3D performance is also very impressive and its 3DMark03 score is far ahead of its Socket 754 rival's.

ABIT's NF8-V may have a basic specification, but its good performance and low price make it a bargain if you want an AGP Socket 754 board.

SPECIFICATIONS Socket 754, nVidia nForce 3 250 AGP chipset, two DDR slots, one AGP, five PCI, two IDE ports, two SATA ports

REVIEW SOCKET 754 MOTHERBOARD

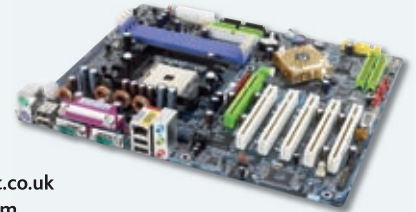
GIGABYTE GA-K8NS Pro

RATING ★★★

PRICE £64 inc VAT

SUPPLIER www.microdirect.co.uk

DETAILS www.giga-byte.com



Gigabyte's GA-K8NS Pro has more features than ABIT's NF8-V, but its results in our benchmarks were mediocre and it is nearly £20 more expensive. There are four SATA ports, but these are split between two different controllers so you are limited to a maximum of two SATA disks per RAID array. The IDE controller also supports two drives in a RAID 0 or 1 configuration.

The GA-K8NS Pro has impressive built-in sound, with an eight-channel audio chip and coaxial and optical S/PDIF audio outputs on the supplied bracket. However, it lagged behind ABIT's Socket 754 board in speed tests.

Buying the GA-K8NS makes sense if you need the extra SATA ports and eight-channel sound, but ABIT's NF8-V is cheaper and faster.

SPECIFICATIONS Socket 754, nVidia nForce 3 250 AGP chipset, three DDR slots, one AGP, five PCI, two IDE ports, four SATA ports



REVIEW SOCKET 775 MOTHERBOARD

ECS
945P-A

RATING ★★★★★

PRICE £57 inc VAT

SUPPLIER www.pcnextday.co.ukDETAILS www.ecs.com.tw

Despite having two PCI Express x16 slots, the 945P-A supports neither SLI or CrossFire, although you can still add a second card to extend your Windows desktop across up to four monitors. It lacks such features as FireWire ports and S/PDIF audio outputs and has only one IDE port, but it supports fast DDR II memory and provides four SATA II slots for a variety of RAID configurations.

The 945P-A performed well in our tests. Its score in our *Shopper* tests was the second best from a Socket 775 board, and 5,347 points in PCMark04 places it just behind the EPoX 5NVA+ and ECS PF22, both of which cost over twice as much. This is an excellent budget buy.

SPECIFICATIONS Socket LGA775, Intel i945P/G PCI Express chipset, four DDR2 memory slots, two PCI Express x16, three PCI slots, one PCI Express x1, three PCI, one IDE port, four SATA II ports

REVIEW SOCKET 775 MOTHERBOARD

EQS
M65P9-ALV

RATING ★★★

PRICE £60 inc VAT

SUPPLIER www.advancetec.co.ukDETAILS www.eqscomputers.com

The Celeron D is our favourite budget processor, and with a graphics chip built in, EQS's Socket M65P9-ALV could be an inexpensive way to build an Intel-based computer. Unfortunately, it has a limited array of ports and features. It supports only DDR and not DDR2 memory. There are only two memory slots and two SATA ports, and no FireWire support or PCI Express x1 slots.

The M65P9-ALV performed poorly for a Pentium 4-based motherboard. It was some way behind the other Intel processor motherboards in both PCMark04 and our *Shopper* application benchmarks. Unless your budget is really tight we'd recommend ECS's 945P-A and a budget PCI Express graphics card instead.

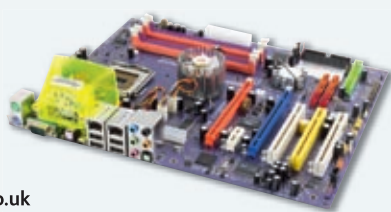
SPECIFICATIONS Socket LGA775, ATI RC410 PCI Express chipset, two DDR memory slots, one PCI Express x16, two PCI, two IDE ports, two SATA ports

REVIEW SOCKET 775 MOTHERBOARD

ECS
PF22 Extreme

RATING ★★★★★

PRICE £123 inc VAT

SUPPLIER www.pcnextday.co.ukDETAILS www.ecs.com.tw

The PF22 Extreme has two PCI Express x16 slots and supports ATI's CrossFire standard. It has two SATA controllers for up to four SATA II and two SATA drives, but only one IDE port. Its four memory slots support up to 8GB of DDR2 RAM, but only the 64-bit version of Windows can access this much.

The PF22 Extreme's 3DMark03 score of 5,726 is impressive. It also coped well with our 2D tests. The EPoX 5NVA+ SLI is a slightly faster Socket 775 motherboard and also supports two 3D cards, but the PF22 Extreme is a good buy if you already have a CrossFire-compatible graphics card. If you don't want to use two 3D cards, the ECS 945P-A is better value.

SPECIFICATIONS Socket LGA775, Intel i955X PCI Express chipset, four DDR2 memory slots, two PCI Express x16, one PCI Express x1, three PCI, one IDE port, four SATA II ports, two SATA ports

REVIEW SOCKET 775 MOTHERBOARD

EPOX
5NVA+ SLI

RATING ★★★★★

PRICE £130 inc VAT

SUPPLIER www.komplett.co.ukDETAILS www.epox.com

EPoX's 5NVA+ SLI is designed for enthusiasts. Its layout is slightly awkward, but it has some useful features and superb performance. It is easy to install thanks to neat features such as power and reset switches that are built into the motherboard and an LCD status and error display. Strangely there is no FireWire port on the back panel, but there is a FireWire bracket in the box. The four SATA II ports can be used together in a four-disk RAID array. Only two PCI slots are available, but there are also two PCI Express x1 slots.

The 5NVA+ performed excellently in our tests. It's a great choice if you want to use an Intel processor with two nVidia graphics cards.

SPECIFICATIONS Socket LGA775, nVidia nForce 4 SLI PCI Express chipset, four DDR2 memory slots, two PCI Express x16, two PCI Express x1, two PCI, two IDE ports, four SATA II ports

REVIEW SOCKET 939 MOTHERBOARD

MSI
K8T Neo2-F V2.0

RATING ★★★★★

PRICE £51 inc VAT

SUPPLIER www.pixmania.co.ukDETAILS www.msi.com.tw

MSI's K8T Neo2-F V2.0 is slimmer than a standard ATX motherboard and has room for just two DDR memory slots. It performed well in our tests, though, and is very good value. Despite having only two DDR slots, it supports dual-channel memory. The layout is fairly awkward, as you have to stretch the ATX power cable over the graphics card to reach its connector. It has only two SATA ports, 5.1 surround sound through three audio ports and no FireWire.

The K8T is one of the fastest Socket 939 boards in the group. Despite being cheaper than Asus's A8V Deluxe AGP, it was easily faster in our *Shopper* benchmarks, PCMark04, 3DMark03 and Doom 3. Unless you need FireWire or more than two memory slots, this is the best choice for Socket 939 and AGP.

SPECIFICATIONS Socket 939, VIA K8T800 Pro AGP chipset, two DDR memory slots, one AGP, four PCI, two IDE ports, two SATA ports

REVIEW SOCKET 939 MOTHERBOARD

ECS
RS482-M

RATING ★★★

PRICE £54 inc VAT

SUPPLIER: www.savastore.comDETAILS www.ecs.com.tw

ECS's RS482-M is the cheapest motherboard in this test to include an integrated graphics processor. It has no PCI Express x1 slots, though, and is not particularly powerful. It supports up to four Serial ATA disks in a RAID array, but doesn't support the newer SATA II standard. Its three PCI slots are adequate for current upgrade cards, but it has no slots for PCI Express x1 cards and only two DDR slots for a maximum of 2GB of system memory.

It performed relatively poorly in our PCMark04 test, couldn't run our Doom 3 benchmark, and its 3DMark03 score shows that it will handle little more than older strategy games. The RS482-M is an inexpensive PCI Express motherboard, but it will be hard to upgrade in the future.

SPECIFICATIONS Socket 939, ATI Radeon RS482 PCI Express chipset, two DDR slots, one PCI Express x16, three PCI, two IDE ports, four SATA ports



REVIEW SOCKET 939 MOTHERBOARD

GIGABYTE
GA-K8N51GMF-9

RATING ★★★★★

PRICE £56 inc VAT

SUPPLIER www.girotech.comDETAILS www.giga-byte.com

Gigabyte's GA-K8N51GMF-9 has fairly pedestrian integrated graphics, but provides a high specification at a low price. It provides four DDR slots, a digital S/PDIF audio output and supports up to four SATA II hard disks in a RAID configuration. Unusually, though, there is no serial port on its back panel.

Its score in our *Shopper* benchmarks is reasonable, but its 3DMark03 score was lower than those of the integrated graphics boards from Asus and ECS. This is an inexpensive PCI Express motherboard, but the Asus A8N-VM CSM-UAYGZ is quicker and costs only £6 more.

SPECIFICATIONS Socket 939, nVidia GeForce 6100 PCI Express chipset, four DDR memory slots, one PCI Express x16, one PCI Express x1, two PCI, two IDE ports, four SATA II ports

REVIEW SOCKET 939 MOTHERBOARD

ASUS
A8N-VM CSM-UAYGZ

RATING ★★★★★

PRICE £62 inc VAT

SUPPLIER www.morecomputers.comDETAILS www.asus.com

ASUS's A8N-VM is one of two motherboards in the group that use nVidia integrated graphics. It is more expensive than the other motherboards with built-in graphics, but its 3D performance is better. It has four SATA II ports, two PCI slots, a PCI Express x16 slot and a PCI Express x1 slot. It also has both D-sub and DVI video outputs. With no S/PDIF outputs, though, it's not easy to connect to a home cinema amplifier.

Its 3DMark03 score is the best in the group from a motherboard with integrated graphics, but it's still not powerful enough for modern games. It ran our *Shopper* benchmarks as fast as some boards with a dedicated graphics card. Whether or not you want to add a graphics card later, it's a great buy.

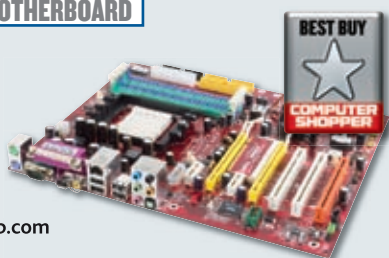
SPECIFICATIONS Socket 939, nVidia GeForce 6150 PCI Express chipset, four DDR slots, one PCI Express x16, one PCI Express x1, two PCI, two IDE ports, four SATA II ports

REVIEW SOCKET 939 MOTHERBOARD

MSI
K8N SLI

RATING ★★★★★

PRICE £81 inc VAT

SUPPLIER www.lowestonweb.comDETAILS www.msi.com.tw

MSI's K8N SLI is the cheapest Socket 939 motherboard here to support two graphics cards in SLI mode. Its performance is not as good as that of Asus's A8N-SLI Premium, but it is almost £40 cheaper. It has four SATA II ports, Gigabit Ethernet and an eight-channel audio chipset with a digital S/PDIF output. It doesn't have a software switch for SLI, though; you need to change a card on the motherboard to enable or disable the twin-graphics card mode.

The K8N SLI's score of 5,524 in 3DMark03 was some way behind that of the A8N-SLI Premium, and its score of 92 in our video-encoding test is lower than average for a Socket 939 motherboard. Nonetheless, this is a great way to build an SLI computer without spending a fortune.

SPECIFICATIONS Socket 939, nVidia nForce 4 SLI PCI Express chipset, four DDR memory slots, three PCI slots, two IDE ports, four SATA II ports

REVIEW SOCKET 939 MOTHERBOARD

ASUS
A8V Deluxe

RATING ★★★★★

PRICE £62 inc VAT

SUPPLIER www.savastore.comDETAILS www.asus.com

ASUS's A8V Deluxe has more connectors than the other Socket 939 AGP board, MSI's K8T Neo2-F, but it's not as fast. Its image manipulation test score was particularly disappointing, and it was way behind the K8T Neo2-F in 3DMark03.

It has only two SATA ports, but there's a FireWire port on the rear panel and header pins for a further FireWire port on the supplied bracket. The rear panel provides coaxial and optical S/PDIF outputs for surround sound. It's a good choice if you need a Socket 939 AGP board with FireWire or more than two memory slots, but otherwise the K8T Neo2-F is faster and better value.

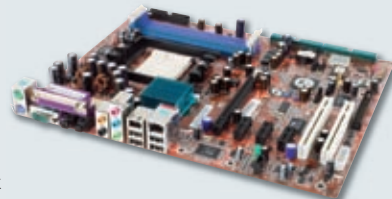
SPECIFICATIONS Socket 939, VIA K8T800 Pro AGP chipset, four DDR slots, one AGP, five PCI, two IDE ports, two SATA ports

REVIEW SOCKET 939 MOTHERBOARD

ABIT
AX8

RATING ★★★★★

PRICE £70 inc VAT

SUPPLIER www.misco.co.ukDETAILS www.abit.com.tw

ABIT's AX8 has four memory slots but only two SATA ports. This limits you to one or two SATA hard disks or a two-disk RAID 0 or 1 array. Apart from this limitation, it's a good motherboard for future upgrades. It has a PCI Express x16 slot for a graphics card, three PCI Express x1 slots for new upgrades and two PCI slots for older cards. As well as analogue outputs, the sound processor has an optical S/PDIF output for connecting to a home cinema system.

The AX8 performed well in our tests. Its score in our image manipulation test was equalled only by the £120 Asus A8N-SLI Premium. The disappointing number of SATA ports lets it down, but it's a good choice if you want an inexpensive PCI Express motherboard with plenty of room for future upgrades.

SPECIFICATIONS Socket 939, VIA K8T890 PCI Express chipset, four DDR slots, one PCI Express x16, two PCI Express x1, two PCI, two IDE ports, two SATA ports

REVIEW SOCKET 939 MOTHERBOARD

ASUS
A8N-SLI Premium

RATING ★★★★★

PRICE £120 inc VAT

SUPPLIER www.microdirect.co.ukDETAILS www.asus.com

ASUS's A8N-SLI is expensive, but it has almost every connector you can think of and performs very well. It has four SATA and four SATA II ports, which allow for a total of eight drives in two RAID arrays, and comes with a box full of SATA cables. It also has two Gigabit Ethernet ports and eight-channel audio with optical and coaxial S/PDIF outputs.

Its 3D performance is unrivalled in this group. Its scores of 5,778 in 3DMark03 and 22.2fps in Doom 3 are the best in the group, and its score of 123 in our image manipulation test was one of the two equal best.

It is far more expensive than the other Socket 939 SLI motherboard in the group, MSI's K8N SLI. If you can afford it, though, you won't be disappointed.

SPECIFICATIONS Socket 939, nVidia nForce 4 SLI PCI Express chipset, four DDR slots, two PCI Express x16, one PCI Express x1, three PCI, two IDE ports, four SATA ports, four SATA II ports



MANUFACTURER	ABIT	GIGABYTE	ECS	ECS	EPOX	EQS	ABIT	ASUS	ASUS	ASUS	ECS
Model	NF8-V	GA-K8NS Pro	945P-A	PF22 Extreme	5NVA+ SLI	M65P9-ALV	AX8	A8N-VM CSM-UAYGZ	A8N-SLI Premium	A8V Deluxe	RS482-M
Rating	★★★★	★★★	★★★★	★★★★	★★★★	★★★	★★★★	★★★★	★★★★	★★★	★★★
Socket	754	754	LGA775	LGA775	LGA775	LGA775	939	939	939	939	939
Form factor	ATX	ATX	ATX	ATX	ATX	microATX	ATX	microATX	ATX	ATX	microATX
Dimensions	305x245mm	305x244mm	305x244mm	305x244mm	305x245mm	244x244mm	305x245mm	244x244mm	305x244mm	220x244mm	244x244mm
Processors supported	Sempron, older Athlon 64	Sempron, older Athlon 64	Celeron D, Pentium 4, Pentium D	Celeron D, Pentium 4, Pentium D	Celeron D, Pentium 4, Pentium D	Celeron D, Pentium 4, Pentium D	Athlon 64, Athlon 64 FX, Athlon 64 X2	Athlon 64, Athlon 64 FX, Athlon 64 X2	Athlon 64, Athlon 64 FX, Athlon 64 X2	Athlon 64, Athlon 64 FX, Athlon 64 X2	Athlon 64, Athlon 64 FX, Athlon 64 X2
northbridge Chipset	nVidia nForce3 250	nVidia nForce3 250	Intel i945P/G	Intel i955X	nVidia nForce4 SLI	ATI RC410	VIA K8T890	nVidia GeForce 6150	nVidia nForce4 SLI	VIA K8T800 Pro	ATI Radeon RS482
southbridge Chipset	nVidia nForce3 MCP	nVidia nForce3 MCP	Intel ICH7	Intel ICH7	nVidia nForce4 MCP04	ATI SB400	VIA VT8237	nVidia nForce430	nVidia nForce4 MCP04	VT8237	ATI Radeon SB400
Passively cooled Northbridge	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Integrated graphics	N/A	N/A	N/A	N/A	N/A	ATI Radeon X300	N/A	nVidia GeForce 6150	N/A	N/A	ATI Radeon Xpress 200
Memory type supported	DDR	DDR	DDR2	DDR2	DDR2	DDR	DDR	DDR	DDR	DDR	DDR
Memory slots	2	3	4	4	4	2	4	4	4	4	2
Maximum memory	2GB	3GB	4GB	8GB	4GB	4GB	4GB	4GB	4GB	4GB	2GB
Dual-channel support	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
INTERNAL PORTS											
Power connectors	1x 24-pin ATX, 1x 4-pin 12V	1x 20-pin ATX, 1x 4-pin 12V	1x 24-pin ATX, 1x 4-pin 12V, 1x 4-pin molex	1x 24-pin ATX, 1x 8-pin 12V, 1x 4-pin molex	1x 20-pin ATX, 1x 4-pin 12V	1x 24-pin ATX, 1x 4-pin 12V	1x 20-pin ATX, 1x 4-pin 12V, 1x 4-pin molex	1x 24-pin ATX, 1x 4-pin 12V	1x 24-pin ATX, 1x 4-pin 12V, 1x 4-pin molex	1x 20-pin ATX, 1x 4-pin 12V	1x 24-pin ATX, 1x 4-pin 12V
AGP	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A
PCI Express x16	N/A	N/A	2	2	2	1	1	1	2	N/A	1
PCI Express x1	N/A	N/A	1	1	2	None	3	1	1	N/A	None
PCI slots	5	5	3	3	2	2	2	2	3	5	3
Other slots	None	None	None	None	None	None	None	None	1x PCI Express x4	None	None
Fan headers	4	4	3	4	4	2	3	2	5	3	3
Floppy drive	1	1	1	1	1	1	1	1	1	1	1
IDE	2	2	1	1	2	2	2	2	2	2	2
SATA	2	4	4x SATA II	4x SATA II, 2x SATA	4x SATA II	2	2	4x SATA II	4x SATA, 4x SATA II	2	4
RAID chipset (maximum RAID drives)	nVidia nForce3 250 (2x SATA)	nVidia nForce3 250 (2x SATA), Silicon Image SiI3512 (2x SATA), GigaRAID i78212 (2x IDE)	Intel ICH7 (4x SATA II)	Intel ICH7R (4x SATA II, 2x IDE), SiI3132 (2x SATA)	nVidia nForce4 MCP04 (4x SATA II)	ATI Radeon SB400 (2x SATA)	VIA VT8237 (2x SATA)	nVidia nForce430 (4x SATA II)	nVidia nForce4 SLI (4x SATA II, 2x IDE), Silicon Image 3114R (4x SATA)	VIA VT8237 (2x SATA)	ATI Radeon SB400 (4x SATA)
FEATURES											
LAN	1x 10/100/1,000	1x 10/100/1,000	1x 10/100	2x 10/100/1,000	1x 10/100/1,000	1x 10/100	1x 10/100/1,000	1x 10/100/1,000	2x 10/100/1,000	1x 10/100/1,000	1x 10/100
Sound (ports)	Realtek AC'97 (5x analogue)	Realtek ALC850 8-channel with optional bracket (3x analogue standard + coaxial/optical S/PDIF on bracket)	Realtek AC'97 (3x analogue)	Realtek High Definition Audio (1x optical S/PDIF out, 5x analogue)	Realtek ALC850 8-channel (1x coaxial S/PDIF out, 1x optical S/PDIF out, 6x analogue)	Realtek AC'97 (3x analogue)	Realtek AC'97 (optical S/PDIF out, 5x analogue)	Soundmax Digital HD audio (3x analogue)	Realtek ALC850 8-channel (1x coaxial S/PDIF out, 1x optical S/PDIF out, 6x analogue)	Realtek ALC850 8-channel (1x coaxial S/PDIF out, 1x optical S/PDIF out, 6x analogue)	Realtek AC'97 (3x analogue)
Surround sound channels	5.1	7.1	5.1	7.1	7.1	5.1	5.1	5.1	7.1	7.1	5.1
USB2 ports/headers	4/2	4/2	4/2	4/2	4/3	4/2	4/2	4/2	4/2	4/2	4/2
FireWire ports/headers	None	0/2	None	1/1	0/2	None	1/1	1/1	1/1	1/1	0/1
Legacy ports	Serial, parallel	2x serial, parallel	Serial, parallel	Serial	Serial, parallel	Serial, parallel	Serial, parallel	Parallel	Serial (bracket), parallel	Serial, parallel	Serial, parallel
Other ports	None	None	None	None	None	D-sub	None	D-sub/DVI	None	Game port on bracket	D-sub and S-video/composite on bracket
Cables included	2x SATA, 1x IDE, 1x floppy	1x SATA power lead, 1x SATA, 3x IDE, 1x floppy	1x SATA power lead, 1x SATA, 1x IDE, 1x floppy	1x SATA power lead, 4x SATA, 1x Ethernet, 2x IDE, 1x floppy	2x SATA power lead, 2x SATA, 2x IDE, 1x floppy, SLI connector	1x SATA, 1x IDE, 1x floppy	1x SATA power lead, 2x SATA, 2x IDE, 1x floppy	1x SATA power lead, 2x SATA, 2x IDE, 1x floppy	4x SATA power lead, 4x SATA, 2x IDE, 1x floppy	2x SATA power lead, 2x SATA, 2x IDE, 1x floppy	1x SATA power lead, 1x SATA, 1x IDE, 1x floppy
Brackets included	1x USB2	1x composite/optical S/PDIF out, 1x USB2 and FireWire	None	1x USB2 + FireWire, parallel, SATA	1x USB2, 1x FireWire	1x USB2, 1x S-video/composite out	1x USB2/FireWire	1x FireWire	1x SATA, 1x USB2 and Game port, 1x USB2, 1x FireWire, 1x Serial	1x FireWire, 1x Game port and USB2	1x S-video/composite video out
Software included	None	Norton Internet Security 2004	None	None	ProMagic Plus, Image It 3.0, Norton Internet Security 2004	None	None	None	InterVideo WinDVD Suite	InterVideo WinDVD Suite	ProMagic Plus
SETUP/OVERCLOCKING											
BIOS	Phoenix	Award	AMI	AMI	Phoenix	Phoenix	Phoenix	AMI	Phoenix	AMI	Phoenix
Voltage adjustment	CPU/chipset/RAM/AGP	CPU/chipset/RAM	CPU/chipset/RAM	CPU/chipset/RAM	CPU/chipset/RAM	Chipset/RAM	CPU/chipset/RAM	None	CPU/chipset/RAM	CPU/chipset/RAM/AGP	RAM
FSB max adjustment	450MHz	455MHz	500MHz	500MHz	1,300MHz	255MHz	400MHz	240MHz	400MHz	300MHz	250MHz
BUYING INFORMATION											
Price (inc VAT)	£47	£64	£57	£123	£130	£60	£70	£62	£120	£62	£54
Supplier	www.komplett.co.uk	www.microdirect.co.uk	www.pcnextday.co.uk	www.pcnextday.co.uk	www.komplett.co.uk	www.advantecetec.co.uk	www.misco.co.uk	www.morecomputers.com	www.microdirect.co.uk	www.savastore.com	www.savastore.com
Details	www.abit.com.tw	www.gigabyte.com	www.ecs.com.tw	www.ecs.com.tw	www.epox.com	www.eqsc.computer.com	www.abit.com.tw	www.asus.com	www.asus.com	www.asus.com	www.ecs.com.tw

LABS VERDICT MOTHERBOARDS

Most of the motherboards in this test performed well, and many offer excellent value. Whatever your budget and whatever you need, there should be one here that's ideal for you.

If you want a Socket 754 motherboard, ABIT's NF8-V is the best choice. It is incredibly cheap but very fast and wins our Best Budget Buy award. If you want to upgrade to socket 939 but keep your

AGP graphics card, MSI's K8T Neo2-FV2.0 is a good choice, as it's fairly fast and inexpensive. If you want to build a cheap PC using a Celeron D processor, the ECS 945P-A is ideal. It lacks FireWire ports, but it's quick and cheap. It wins a Best Budget Buy award.

If you're building a new PCI Express PC on a budget, Asus's A8N-VM CSM-UAYGZ is a great choice. It's fast, and has integrated graphics so you

can use it now and add a PCI Express graphics card later. It wins our Best Buy award.

Two motherboards stand out for gamers. The Asus A8N-SLI Premium is powerful and has every feature or connector you could want, but it costs £120. The MSI K8N SLI isn't as fast, but it ran Doom 3 at less than 1fps slower and costs just £81. It's a bargain and wins our Best Buy award. **CS**



GIGABYTE	MSI	MSI
GA-K8N51GMF-9	K8N SLI	K8T Neo2-F V2.0
★★★★	★★★★★	★★★★★
939	939	939
microATX	ATX	ATX
244x244mm	305x245mm	305x194mm
Athlon 64, Athlon 64 FX, Athlon 64 X2	Athlon 64, Athlon 64 FX, Athlon 64 X2	Athlon 64, Athlon 64 FX, Athlon 64 X2
nVidia GeForce 6100	nVidia nForce4 SLI	VIA K8T800 Pro
nVidia nForce4 30	nVidia nForce4 MCP04	VT8237
Yes	No	Yes
nVidia GeForce 6100	N/A	N/A
DDR	DDR	DDR
4	4	2
4GB	4GB	2GB
Yes	Yes	Yes
1x 24-pin ATX, 1x 4-pin 12V	1x 24-pin ATX, 1x 4-pin 12V, 1x 4-pin molex	1x 20-pin ATX, 1x 4-pin 12V
N/A	N/A	1
1	2	N/A
1	2	N/A
2	3	4
None	None	None
2	4	2
1	1	1
2	2	2
4x SATA II	4x SATA II	2
nVidia nForce430 (4x SATA II)	nVidia nForce4 SLI (4x SATA II, 4x IDE, 2x SATA II)	VIA VT8237 (2x SATA)
1x 10/100/1,000	1x 10/100/1,000	1x 10/100/1,000
Realtek ALC880 (minijack S/PDIF out, 5x analogue)	Realtek ALC850 8-channel (1x coaxial S/PDIF out, 1x optical S/PDIF out, 6x analogue)	Realtek AC'97 (3x analogue)
7.1	7.1	5.1
4/2	4/3	4/2
1/1	1/1	None
Parallel	Serial, parallel	Serial, parallel
D-sub	None	None
1x SATA, 1x IDE, 1x floppy	1x SATA power lead, 1x SATA, 1x IDE, 1x floppy, SLI connector	1x SATA power lead, 1x SATA, 1x IDE, 1x floppy
None	1x USB2	None
None	None	Norton Internet Security 2005
Award	Phoenix	Phoenix
None	CPU/chipset/RAM	RAM/AGP
300MHz	400MHz	232MHz
£56	£81	£51
www.gigabyte.com	www.lowestonweb.com	www.pixmania.co.uk
www.giga-byte.com	www.msi.com.tw	www.msi.com.tw

KEY

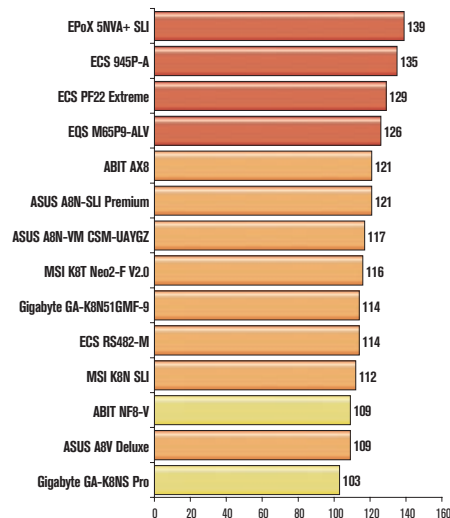
SOCKET 775

SOCKET 939

SOCKET 754

2D Performance Benchmarks

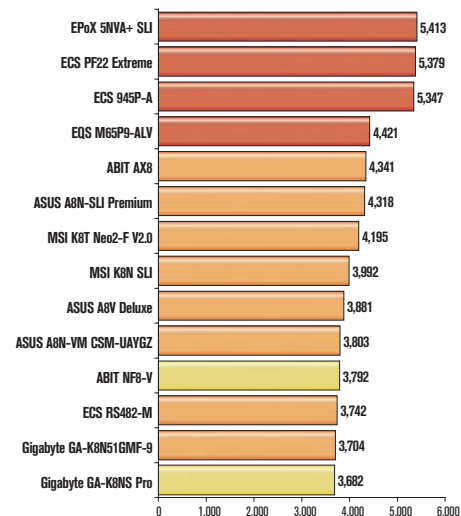
Shopper application tests



SETTINGS We run our application tests at 1,024x768 resolution and in 32-bit colour WEB
www.computershopper.co.uk

Our 2D benchmarks are designed to show how PCs stand up to the toughest tasks Windows can throw at them. They include video-encoding, image-editing and generating a set of MP3s. See page 156 for details.

PCMark04

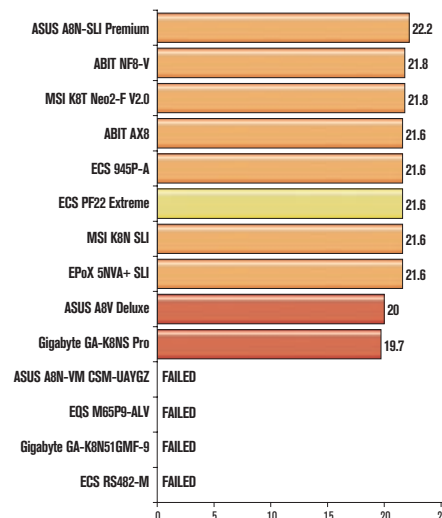


SETTINGS 1,024x768 resolution, 32-bit colour, default settings WEB
www.futuremark.com

As well as using our own benchmarks we test all PC systems using Futuremark's PCMark04, which performs a variety of tests to measure system performance. See page 156 for details.

3D Performance Doom 3/3DMark03

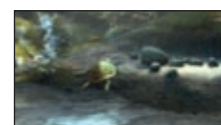
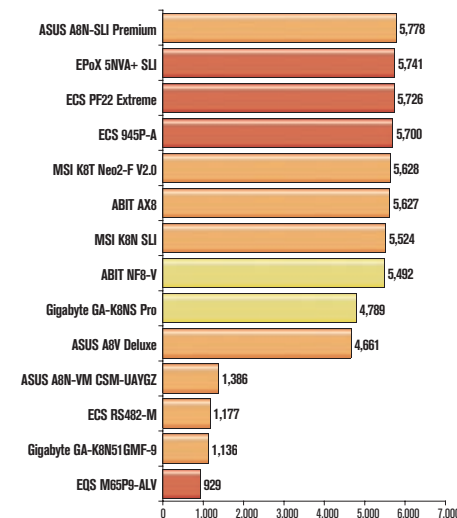
Doom 3



SETTINGS 1,024x768 resolution, high quality, 4x AA WEB
www.doom3.com

We run a timed demo in Doom 3 to test whether a PC has the power needed to play cutting-edge 3D games with ease. A good score here means that it should cope with any graphically intense 3D game.

3DMark03



SETTINGS 1,024x768 resolution, 32-bit colour, default settings WEB
www.futuremark.com

3DMark03 is Futuremark's 3D benchmark. It comprises four game tests from four different genres. The workload is representative of games coming on to the market now.